

## PCT

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT



(PCT Article 36 and Rule 70)

Applicant's or agent's file reference LU6036	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/PEA/416)	
International application No. PCT/EP 03/07568	International filing date (day/month/year) 14.07.2003	Priority date (day/month/year) 15.07.2002
International Patent Classification (IPC) or both national classification and IPC C08F110/06		
Applicant BASELL POLYOLEFINE GMBH		

- This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
- This REPORT consists of a total of 5 sheets, including this cover sheet.  
  
☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).  
  
 These annexes consist of a total of 2 sheets.

- This report contains indications relating to the following items:
 

I	<input checked="" type="checkbox"/>	Basis of the opinion
II	<input type="checkbox"/>	Priority
III	<input type="checkbox"/>	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
IV	<input type="checkbox"/>	Lack of unity of invention
V	<input checked="" type="checkbox"/>	Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
VI	<input checked="" type="checkbox"/>	Certain documents cited
VII	<input type="checkbox"/>	Certain defects in the international application
VIII	<input checked="" type="checkbox"/>	Certain observations on the international application

Date of submission of the demand  23.01.2004	Date of completion of this report  08.10.2004
Name and mailing address of the international preliminary examining authority:   European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized Officer  Parry, J  Telephone No. +31 70 340-1032  

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/EP 03/07568

**I. Basis of the report**

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

**Description, Pages**

1-31 as originally filed

**Claims, Numbers**

1-6 received on 14.07.2004 with letter of 13.07.2004

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).  
☐ the language of publication of the international application (under Rule 48.3(b)).  
☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.  
☐ filed together with the international application in computer readable form.  
☐ furnished subsequently to this Authority in written form.  
☐ furnished subsequently to this Authority in computer readable form.  
☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.  
☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:  
☒ the claims, Nos.: 7-10  
☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

6. Additional observations, if necessary:

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**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

**1. Statement**

Novelty (N)	Yes: Claims	1-6.
	No: Claims	
Inventive step (IS)	Yes: Claims	
	No: Claims	1-6.
Industrial applicability (IA)	Yes: Claims	1-6.
	No: Claims	

**2. Citations and explanations**

**see separate sheet**

**VI. Certain documents cited**

**1. Certain published documents (Rule 70.10)**

and / or

**2. Non-written disclosures (Rule 70.9)**

**see separate sheet**

**VIII. Certain observations on the international application**

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

**see separate sheet**

**INTERNATIONAL PRELIMINARY  
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**Re Item I**

**Basis of the opinion**

1. The amendments are allowable.

**Re Item V**

**Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

The following documents (D1-D2) will be referred to (see the ISR for the relevant passages):

D1: WO 99 40129 A (BOHNEN HANS ;TARGOR GMBH (DE); FRITZE CORNELIA (DE)) 12 August 1999 (1999-08-12)

D2: WO 99 06414 A (BOHNEN HANS ;TARGOR GMBH (DE)) 11 February 1999 (1999-02-11)

1. The subject matter of claims 1-6 of the present application is not considered inventive for the following reasons: D1, which is considered to be the closest prior art, essentially describes the preparation and use of olefin polymerisation catalysts comprising the components A+ 2B + C+ D+ E (corresponding to present claim 1, components ABCDE), but where the reaction product ABCD is isolated before addition to E. A + B results in, among other products, compounds of the type: ((C6F5)2-B-O)2-AIR ( R = Me, or separately iBu). The so-prepared catalysts are added to additional iBu3Al in the polymerisation reactor (which corresponds to the second component B of present claim 2). The subject-matter of claims 1-6 differs in that no "work-up (isolation)" of the intermediates occurs (feature 1). The technical effect of this feature is claimed to be to increase polyolefin productivity whilst using less boron reagent (p.30-31), but differing mole ratios of precatalyst (metallocene) to the other components are used in the comparisons, therefore the comparative examples are invalid, as all conditions must be identical save for the "work-up" part of the process for preparing the catalysts. Each and every mole value used has to be clear in the examples and the comparative examples. If the mole ratios of aluminium reagents to metallocene vary between comparisons, then this can be expected to have an effect on the influence the boron reagent has on the catalytic system as a whole, not only because organoaluminiums are effective cocatalysts in their own right, but also because of the stoichiometry of the reaction between the boronic acid and trimethyl aluminium of the comparison differs from that of the stoichiometry of the reaction between the boronic acid and the (various) organoaluminiums of the present invention,

where everything is done in a "one-pot" reaction. Said mole ratio values have to be taken from the final isolated product of the comparative examples, ie the values of the final catalyst loadings and not from the initial values added to the mixture, as reagents can be washed away in the work up and it is obvious to use less of a reagent if one knows that it will not be washed away in any workup (isolation) procedure. The catalyst activities should then have been compared with those of the present invention. Furthermore, it is unclear if the minimum amount of boron reagent necessary to yield the maximum activity has been employed in the catalyst loadings of the comparative examples.

All of this means that there is no clear demonstration of this stated effect. Therefore, the objective problem can only be formulated as to provide alternative processes for producing catalysts for olefin polymerisation. The solution proposed in claims 1-6 of the present application cannot be considered as involving an inventive step because feature 1 is a trivial modification to make. In fact D2 discloses such a process without "work-up" for preparing very similar catalysts which differ from the present catalysts in that only component C is missing. The skilled person would therefore regard it as a normal option to combine the teachings of D1 with those of D2 in order to solve the problem of the present application.

#### **Re Item VI**

##### **Certain documents cited**

Patent No.: WO 02 098930 A (EQUISTAR CHEM LP) 12 December 2002 (2002-12-12) . Publication date: 12/12/02/. Filing date: 09/05/02/. Priority date: 04/06/01/. Relevant for claims: 1-10

#### **Re Item VIII**

##### **Certain observations on the international application**

The following objections are made under Art. 6 (PCT):

1. Claims 1 and 6: out of groups 13,14 and 15, only boron, carbon and silicon are classified as being a non-metal according to the IPC, so it is confusing for such compounds of claim 6 to be defined in claim 1, part "C" as "organic compounds".

2. Claim 6: (i) X cannot be 0 or 1 when  $y = 1$ .

(ii) A = "a group comprising 2-20 atoms" is unclear as such a group cannot necessarily be distinguished from "R4". It is clear from the application as a whole that sufficient support is provided for A being defined as a group 13 atom.

We claim:

1. A process for preparing a catalyst solid for olefin polymerization which is obtainable by bringing
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- A) at least one organic transition metal compound,
- B) at least one organometallic compound,
- 10 C) at least one organic compound having at least one functional group containing active hydrogen,
- D) at least one Lewis base and
- 15 E) at least one support,
- into contact with one another, wherein the components are combined in any order without any work-up of the mixtures present at intermediate stages being carried out.
- 20 2. A process for preparing a catalyst solid for olefin polymerization as claimed in claim 1, wherein the component B) used is a mixture of at least two different organometallic compounds.
- 25 3. A process for preparing a catalyst solid for olefin polymerization as claimed in claim 2, wherein the component B) used is a mixture of at least one aluminum-containing organometallic compound and at least one boron-containing organometallic compound.
- 30 4. A process for preparing a catalyst solid for olefin polymerization as claimed in claim 2 or 3, wherein the component B) comprises at least two different aluminum-containing organometallic compounds.
- 35 5. A process for preparing a catalyst solid for olefin polymerization as claimed in any of claims 1 to 4, wherein the functional groups containing active hydrogen of the component C) are hydroxyl groups.
- 40 6. A process for preparing a catalyst solid for olefin polymerization as claimed in claim 5, wherein the hydroxyl groups are bound to an element of group 13, 14 or 15 of the Periodic Table.

REPLACED BY  
ART 3A AMDT

7. The use of a catalyst solid prepared as claimed in any of claims 1 to 6 for the polymerization of olefins.
8. A catalyst solid obtainable by a process as claimed in any of claims 1 to 6.
9. A catalyst system comprising at least one catalyst solid as claimed in claim 8.
10. A process for the polymerization of olefins using a catalyst solid as claimed in claim 8.

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